

Claim 16, line 2, delete "(1, 3)".

Claim 17, line 2, delete "(53)" and "(10)".

Claim 18, line 8, after "lower" insert -- circular --;

line 10, delete "non-positive" and insert -- frictional --;

5 line 13, delete "engagement" and insert -- relationship --;

line 22, 23, delete "whereby each said cutter unit can be driven from said driving unit independently of each other cutting unit".

8 Claim 20, line 2, delete first occurrence of "cutting" and after "each" insert --circular-

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line 3, before "blades" insert -- circular --.

N.E. 10 Claim 21, line 8, after "second" insert -- circular --;

line 14, delete "non-positively" and insert -- releasably --;

line 17, after "said" insert -- circular --.

Remarks

The claims presented for prosecution in this application are 1 - 3, 5 - 8, 10 - 12, and 14 - 21.

Priority

Examiner has maintained that priority has not been properly established in the current application. Examiner's attention is directed to the Preliminary Amendment dated November 20, 1997, wherein a claim for priority was expressly made on page 1.

Specification

The objections raised in paragraph 4 have been obviated by rewriting the advantages on pgs. 3 - 4 in complete and explanatory sentences. As discussed below, Fig. 2 has been amended to include acute angle α .

Drawings

The objections raised in paragraphs 5 - 7 of the Office Action have been obviated by amendments to the drawings where appropriate. Enclosed is a set of informal drawings which illustrate in red the reference to acute angle α in Fig. 2, and a reversal of the reference numerals 26 and 27 in Fig. 1 for consistency with Fig. 3. The drawings also indicate that the drive unit 30 is a detachable drive unit as described in the specification on page 6 at line 25.

Claim Rejections

In paragraph 10, claims 18 - 20 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time of the application was filed, had possession of the claimed invention.

Claim 18 has been amended to define a plurality of cutter units driven from a single driving unit. Language limiting the claim to "independently driven" cutter units had been removed and the claim is believed to be in condition for allowance. Likewise, claims 19 - 20 depend from claim 18 and are thus allowable.

In paragraph 11, claims 1 - 3, 5 - 8, 10 - 12, and 14 - 21 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make or use the invention.

Regarding reference to page 6, lines 24 - 33, the paragraph beginning with line 19 on page 6 has been amended to avoid further confusion regarding the drive shaft and drive unit by eliminating the "non-positive" reference which apparently is not synonymous with "detachable."

5 -> Regarding the Examiner's questions directed to the bush on p. 7, lines 11 - 21, a figure is enclosed to further clarify for Examiner the cooperation of the bush 13 with the pin wrench 25. If considered necessary by the Examiner, the enclosed figure can be added to the application, however, the figure is not considered necessary since it only shows the circumaxial slot for the pin wrench. Fig. 4 clearly shows how
10 rotation of the threaded bush 13 relative to the slotted nut 23 using pin wrench 25 produces axial movement of the bush 13, bearing 11, and shaft 1 in the upper leg 51
12 of frame 5.

In reference to the Examiner's continued confusion about pg. 7 of the specification, line 29 to pg. 8, line 14, Applicant directs Examiner's attention to the table on page 8 and the discussion of prior art from page 1, line 15 to page 2, line 22. Certain measurements and values of features in the prior art are represented as a baseline of 100% in the table. The parameters are illustrated for comparison
purposed in Figs. 5 (prior art) and 6 (present invention). The corresponding measurements or values in the present invention are given as a percentage of the baseline. For example, the blade overlap is 40% of the prior art overlap. Similarly, due to the smaller blade diameter and larger cutting angle, the cutting blades in the present invention spend 60% of the time used by the prior art to cut the same material thickness. Each parameter, other than cutting times, has a reference numeral in the table of page 8 corresponding to the parameter illustrated in Figs. 5 and 6. See specification p. 7, lines 29 - 32 and the references to Figs. 5 and 6 in the table on p. 8. The purpose of the table is to substantiate the improved cut-edge quality achieved by the invention as set out on p. 4, lines 12 - 21 of the specification.

Cutting angle was previously defined in the Amendment of November 20, 1997, page 9, lines 3 - 6 and is also illustrated in Figs. 5 and 6.

In stating "merely shows inherent results" of a smaller cutting unit, Examiner has oversimplified the significance of the present invention. Blade diameter, shaft diameter, cutting angle, and cutting force on the blade are related to each other. The prior art design requires thick shafts to apply the proper cutting forces, however the thick shafts require large blade diameters. Large blade diameters, in turn, reduce cutting angle, thereby requiring more cutting force and demanding larger shafts. The design of the present invention allows reduced shaft diameters which allow smaller blade diameters, thereby increasing cutting angle and reducing the forces required to cut material.

In paragraph 12, claims 1 - 3, 5 - 8, 10 - 12, and 14 - 21 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding paragraph 12(i), claims 1 and 10 have been amended to establish proper antecedent basis.

Regarding paragraph 12(ii), where the clarity of lines 9 - 11 of claim 1 is questioned, the language has been amended to clarify the relationship between the blade shafts, which was inadvertently omitted from the last amendment. As explained more clearly on p. 7 of the specification, the "non-positive drive connection" in one embodiment is accomplished by frictional engagement of the circular blades and transport rings.

Regarding the questions about the "means" language in claims 1 and 21, Examiner's attention is directed to page 6, lines 19 - 21 of the specification. A gear 17, best seen in Fig. 4, but also shown in Figs. 1 and 3, is disclosed as having a substantially square borehole 22 for square drive shaft 16, also shown in Fig. 1. Additionally, Fig. 1 has been amended to schematically illustrate the disconnectable.

drive unit 30 that connects with square drive shaft 16. Gear 17 is slidable along shaft 16 to allow its cutter unit to be positioned and driven anywhere along the shaft, as well as to allow easy removal of the cutter unit from the end of the shaft when the drive unit 30 is disconnected. The coupling between the drive unit 30 and the square drive shaft 16 is not important and may take many forms, including splines or a simple slip coupling complimentary to the square shaft. Socket wrench sets are common examples of disconnectable square drives.

Referring to paragraph 12(iii), the clarity and scope of claim 6 is questioned. The claim is directed to the combination of a cutter unit and the recited means for mounting and positioning as discussed from page 5, line 32 to page 6, line 13. The rails 6 and bushings 26, 27 provide a means of mounting the frames 5, as well as positioning the cutter units "in the transverse direction 7 perpendicular to the longitudinal direction 8." Such a bushing and shaft configuration is known generally and further details have therefore been omitted.

Referring to paragraph 12(iv), claim 7 is identified by the Examiner as vague and indefinite. Applicant disagrees. Examiner's attention is directed to page 7, lines 11 - 21 that disclose a threaded displacement bush 13 that is rotatable in relation to the frame 5, thereby producing axial movement of the upper circular blade. A means for rotatably supporting (claim 1) does not encompass axial movement of the rotating axis. Claim 7 is directed to axial movement using an "axially displaceable bush," and the claim should be allowed.

Regarding paragraph 12(v), where the clarity of claim 10 is questioned, Examiner's attention is directed to the table and discussion on page 8 and Figs. 5 and 6 where the angle is illustrated by the tangents as previously explained. See Preliminary Amendment of November 20, 1997, page 9, lines 3 - 6. Claim 10 refers to the increased cutting angle disclosed in the table on page 8, which improves the quality of the cut edge. The cutter unit of the state of the art achieves a cutting angle

17 of only 5 degrees.

5 The cutting angle is directly related to blade diameter and the overlap of the blades. The more the blades overlap, the higher the angle between the flat material and the blades at initial contact. Reducing the overlap moves the tangents of the blades closer to the flat material. Therefore, with smaller blades, less overlap is needed to achieve a desired cutting angle, as seen in Figs. 5 and 6.

10 Referring to paragraph 12(vi), claim 18 is identified by the Examiner as vague and indefinite. The claim has been amended to include only a means for releasably coupling each cutter unit to a driving unit. The "means for releasably coupling" refers to the approximately square cross-section of drive shaft 16 and the cooperating borehole 22 discussed on page 6, lines 19 - 24.

Claim Rejections Based on Prior Art

3 Claims 1 - 3, 5 - 8, 10 - 12, and 14 - 21 were rejected under 35 U.S.C. §102(b) as being unpatentable over U.S. Pat. No. 4,116,098 to Suzuki et al. In order to support a rejection under §102(b), each element and limitation of the rejected claims must be found in a single reference, or a §102 rejection is improper.

Suzuki discloses a gang slitting machine having multiple cutter units 15A, 15B suspended between housings 183, 185 and supporting member 179, 181. An upper blade 17 is driven by an upper drive shaft 21, and a lower blade 19 is driven by a lower shaft 23. (See Suzuki, col. 3)


The present invention, on the other hand, utilizes a single drive shaft to drive the entire cutter unit. The drive shaft drives a lower gear which is attached to a lower blade and an associated transport ring. The upper blade and upper transport ring are driven by friction when a sheet is introduced between the lower, motor-driven blade/transport ring and the upper blade/transport ring. A very precise sheet metal cut is achieved in the present invention without driving the upper

blade, thereby making the cutter much simpler than Suzuki, which requires separate drive shafts for the upper and lower blades. Suzuki also does not have a flat, interconnecting yoke as in the present invention. Therefore, because each element of the present invention is not found in a single reference, the rejection under §102 should be withdrawn.

The Examiner cited Cox et al. as pertinent prior art. However, Cox fails to disclose the novel blade support and drive features of the present invention.

Accordingly and in the light of the discussion above, favorable consideration is requested. A clean set of claims 1 - 3, 5 - 8, 10 - 12, and 14 - 21 as amended are included herein for reference by the Examiner.

Respectfully submitted,

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